भारतीय मानक **IS 2746 : 2023**

Indian Standard

स्प्रिंग बोर्ड — विशिष्टि

(पहला पुनरीक्षण)

Spring Boards — Specification

(First Revision)

ICS 97.220.30

© BIS 2023

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

February 2023 **Price Group 5**

Sports Goods Sectional Committee, PGD 41

FOREWORD

This Indian Standard (First Revision) has been adopted by the Bureau of Indian Standards after the draft is finalized by the Sports Goods Sectional Committee had been approved by the Production and General Engineering Division Council.

The Spring board is also known as the vaulting board. It is an essential equipment in many gymnastics events. It is a platform set upon one or usually multiple springs used in artistic gymnastics to propel a gymnast who jumps upon it further than if they had otherwise jumped off a fixed platform. The spring board is a vital part of the vault event, and is commonly used in some routines of other events, such as the balance beam or uneven bars.

This standard was first published in 1964. The revision of this standard has been brought out to align this with the latest rules and regulations followed by International Federation of Gymnastics. In this revision, the following significant modifications have been incorporated:

a) Test method has been updated;
b) Construction of spring board has been updated; and
c) Spring boards are classified as soft and hard boards as per the uses.

The composition of the Committee, responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’

Indian Standard

SPRING BOARDS — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the requirements for spring board.

2 TERMINOLOGY

2.1 Deflection — The measured distance (in mm) between the starting position of an impact site and the maximum displacement of the impactor below the starting position of an impact site.

2.2 Height of Rebound — The measured distance (in mm) between the starting position of an impact site and the maximum displacement of the impactor above the starting position of an impact site.

2.3 Impactor — The striking part of the test apparatus.

2.4 Impact Velocity — The velocity of the impactor, expressed in m/s, immediately prior to crossing the starting position of an impact site on impact.

2.5 Maximum Force (Fmax) — The maximum value of force measured during the impact and expressed in Newton (N).

2.6 Starting Position of an Impact Site — The vertical position of an impact site at the surface of an unloaded spring board from which the total deflection and total height of rebound are determined.

2.7 Theoretical Drop Height — A calculated drop height that equates the measured velocity of the impactor at the moment of impact to a height that would generate the same velocity if the test were performed at sea level and there was no friction to retard the impactor during a drop from that height.

3 CLASSIFICATION

3.1 Based on the uses, the spring boards are classified as follow:

a) Hard board
b) Soft board

3.2 Hard spring board shall be labeled by a dot on the surface of with clear contrast on the longitudinal mid-line (*see* Fig. 1).

4 CONSTRUCTION AND WORKMANSHIP

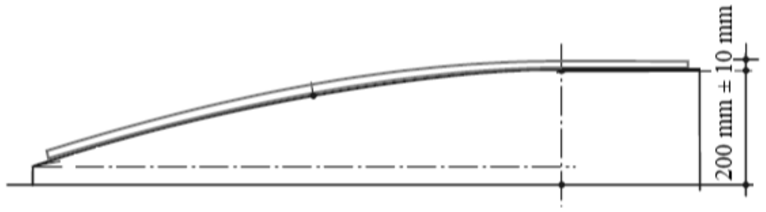
4.1 The shape and dimensions of spring board shall be as given in Fig. 1. Where shapes and dimensions are not specified, these are left to the discretion of the manufacturer.

4.2 The upper surface of the board shall raise in an arched form, approaching the horizontal between 750 mm to 950 mm, measured from frontal angle. The height reached at this point, may not be extended. After this point, the upper surface of the board may continue horizontal or slope downward. The base of the board may be larger, but cannot extend more than 20 mm beyond the projection of the board.

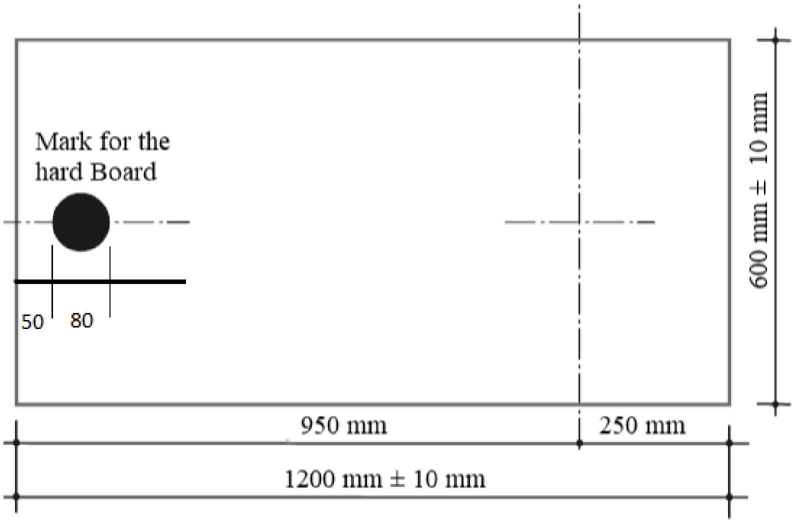
4.3 The jumping-off surface on the head board shall be slip-proofed or shall have a slip-proof covering. The thickness of the cushion cover shall be 20 mm ± 5 mm.

4.4 The board shall not slide at the time of impact of the athlete. The bottom side of the board shall have anti-slip devices like rubber or ledges or discs of rubber.

4.5 The vaulting board and its base shall not have any sharp corners, edges, or protruding parts. They shall be cushioned and rounded. The board shall not produce any disturbing noise during use.



Side View



Top View
(All dimensions in millimetres)

FIG. 1 SPRING BOARD

5 REQUIREMENTS

5.1 Material

The materials of the head board and the floor board are left to the discretion of the manufacturer, but spring board shall be capable of withstanding the test specified in **6**.

5.2 Colour

The choice of colour for the spring board is left to the discretion of the manufacturer, except the dot for hard boards shall not have optically disturbing patterns, stripes, or insignia.

6 PERFORMANCE TESTS REQUIREMENTS

When tested according to the procedures described in **A-3**, the values of the measured variables shall be as given in Table 1 and Table 2 for hard spring board and soft spring board respectively.

Table 1 Requirements for Hard Spring Board
(*Clause* 6)

Sl No.	**Variables**	**Deflection,** mm	**Height of Rebound,** mm	**F_{max}, N**
(1)	(2)	(3)	(4)	(5)
(i)	Mean value across impact sites 1 to 5 (*see* Fig. 2)	$55 \leq x \leq 68$	$340 \leq x \leq 400$	$x \leq 4000$
(ii)	Difference between the highest and lowest mean values on impact sites 1 to 5 (*see* Fig. 2)	≤ 15	≤ 100	—

Table 1 (*Concluded*)

Sl No.	**Variables**	**Deflection,** mm	**Height of Rebound,** mm	**F$_{max}$, N**
(1)	(2)	(3)	(4)	(5)
(iii)	Difference between the mean value on impact sites 6 and 7 (*see* Fig. 2)	≤ 4	≤ 25	≤ 150

NOTE — ‘x’ represents the mean values of the measured variables.

Table 2 Requirements for Soft Spring Board
(*Clause* 6)

Sl No.	**Variables**	**Deflection,** mm	**Height of Rebound,** mm	**F$_{max}$, N**
(1)	(2)	(3)	(4)	(5)
(i)	Mean value across impact sites 1 to 5 (*see* Fig. 2)	62 ≤ x ≤ 80	340 ≤ x ≤ 400	x ≤ 4000
(ii)	Difference between the highest and lowest mean value on impact sites 1 to 5 (*see* Fig. 2)	≤ 15	≤ 100	—
(iii)	Difference between the mean value on impact sites 6 and 7 (*see* Fig. 2)	≤ 4	≤ 25	≤ 150

NOTE — ‘x’ represents the mean values of the measured variables

7 MARKING AND PACKING

7.1 Packing

The spring boards shall be packed as agreed to between the purchaser and the supplier.

7.2 Marking

7.2.1 Each spring board shall be marked with following information:

a) Manufacturer’s name or identification mark; and
b) Date and year of manufacturing.

7.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the standard mark.

ANNEX A

(*Clause* 6)

PERFORMANCE REQUIREMENT

A-1 TEST SPECIMEN

The test specimen submitted for testing shall consist of a spring board as it is intended to be used during training and/or competition.

A-2 TEST APPARATUS

A-2.1 Impact Test Machine

Any type of dynamic testing apparatus that is capable of impacting a test specimen at a prescribed impact velocity and monitoring and recording the acceleration - time history of the impactor is acceptable. The impact test machine and the impactor shall have sufficient rigidity to eliminate undesirable vibrations in the apparatus which might be recorded on the acceleration - time curve. The impact test machine shall also be designed in such a manner that only the impact face contacts the test specimen at any time during the test procedures.

A-2.2 Impactor

The impactor shall be 20 kg ± 0.2 kg and shall have a flat impact face with a 10 cm ± 0.5 cm diameter. The edge of the impactor face should be relieved to eliminate sharp edges. Provision shall be made so that the accelerometer can be securely fastened parallel to the vertical axis of the impactor with a maximum deviation of ± 5 degrees.

A-2.3 Recording Equipment

The recording equipment shall meet the following criteria:

A-2.3.1 *Acceleration – Time*

The selection of the specific acceleration - time recording equipment, including transducers and recorders, is at the discretion of the test laboratory. However, the recording system shall have a frequency response adequate to measure the peak acceleration value to an accuracy of ± 5 percent of the true value. The total system, detection, and recording, shall be capable of measuring impact accelerations of up to 200 g at frequencies from 2 Hz to 1 000 Hz to an accuracy of ± 5 percent. The minimum sampling rate of the data acquisition system shall be 5 000 Hz.

A-2.3.2 *Displacement – Time*

It is optional, but desirable, that the displacement - time history is recorded by a separate transducer. Any transducer that provides a linear signal proportional to the displacement of the impactor along the impact axis which can be monitored simultaneously with the acceleration - time trace is acceptable. If displacement is recorded, the test equipment shall have means to determine and record the starting position of an impact site of the test specimen from which the total deformation and rebound height are determined.

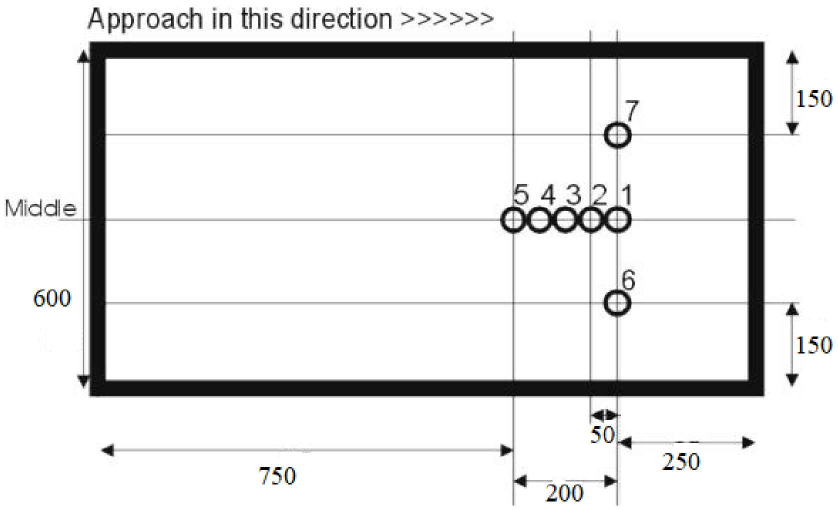
A-2.4 Filtering

The signal from all transducers shall be conditioned with a low pass filter which complies with channel class 1 000 of SAE recommended practice J211. A fourth-order Butterworth low pass filter with a cut-off frequency of 1 000 Hz meets this requirement.

A-3 TEST PROCEDURE

A-3.1 Impact Location

A total of seven impact sites shall be designated on the test specimen (*see* Fig. 2).



(All dimensions are in millimetres)

FIG.2 IMPACT LOCATION ON THE SPRING BOARD

A-3.2 Impact Test Procedure

A-3.2.1 Place the test specimen under the impact test machine on a smooth, solid floor (concrete or metal plate) and orient the impactor such that the centre of the impact face will contact one of the designated impact test sites.

A-3.2.2 Raise the impactor to an appropriate drop height such that it will contact the test specimen with an impact velocity of 3.96 m/s ± 3 percent. This corresponds to a theoretical drop height of 0.8 m.

A-3.2.3 Release the impactor and capture the acceleration - time history and displacement - time history (if applicable) using recording equipment described in **A-2.3**.

A-3.2.4 Upon completion of a given impact test, raise the impactor off the surface of the test specimen.

A-3.2.5 The duration between tests at a given impact site shall not be less than 30 seconds.

A-3.2.6 Each test specimen shall receive a total of 70 impacts. Impact each of the seven impact sites ten times.

A-4 CALCULATIONS

A-4.1 Immediately following each test, record the following measurements: F_{max} (N), deflection (mm), and height of rebound (mm).

A-4.2 The last eight tests for each impact site shall be used to determine the arithmetic mean value of a measured variable for each measurement point.

A-4.3 Calculate the mean values of deflection, height of rebound, and F_{max} across all impact sites rounded to zero decimal places.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Sports Goods Sectional Committee, PGD 41

Organization	*Representative(s)*
Sports Goods Export Promotion Council	SHRI TARUN DEWAN (***Chairperson***)
All India Lawn Tennis Association, New Delhi	SHRI NAR SINGH
Anand & Anand	SHRI ASHISH ANAND
Athletic Federation of India	SHRI SANDEEP MEHTA SHRI GOPALA KRISHNAN (*Alternate*)
Central Institute of Plastics Engineering & Technology (CIPET), Murthal	DR S. N. YADAV
COSCO India Pvt. Ltd, Gurgaon	SHRI PANKAJ JAIN SHRI NARINDER JAIN (*Alternate*)
Director Equipment Sports Authority of India, New Delhi	SHRI ROQUE DIAS
Freewill Sports Pvt. Ltd., Jalandhar	SHRI RAJESH KHARBANDA
Government e Market Place, New Delhi	SHRI N K MALHOTRA
Gymnastic Federation of India, Mumbai	SHRI RIAZ BHATI
Hockey India	COMMANDER R K SRIVASTAVA
Micro, Small and Medium Enterprises, Technology Development Centre, New Delhi	SHRI V. K. SINGH
NELCO (India) Pvt Ltd, Meerut	SHRI AMBER ANAND
Office of Development Commissioner (MSME), Delhi	SHRI SUNIL GUPTA
Premier Enterprises, Meerut	SHRI SUMESH AGARWAL SHRI KSHITIJ AGARWAL (*Alternate*)
Process Cum Product Development Centre, Meerut	SHRI SUNIL GUPTA
Ranson Sports Industry, Jalandhar	SHRI ARVIND SINGH RANA
Sanspareils Greenlands Pvt Ltd, Meerut	SHRI PUNEET ANAND ALOK MISHRA (*Alternate*)
Shri ram Institute For Industrial Research, Delhi	DR VINAY TYAGI

Soccer International Pvt. Ltd. Jalandhar	MS SHAALINI GUPTA
Softball Association of India	MS SHIBANI TAGORE
Sports Goods Manufacturers and Exporters Association (SGMEA), Jalandhar	MS HARSHITA
Sports Line, New Delhi	SHRI OJASVI NAGPAL
Stag International Sports, Meerut	SHRI RAKESH KOHLI SHRI VIVEK KOHLI (*Alternate*)
Universal Sports, Jalandhar	SHRI MAHESH CHADHA
Vats Sports, Meerut	SHRI LOKESH VATS
Voluntary Organisation In Interest Of Consumer Education (Voice), New Delhi	SHRI M. A. U. KHAN
BIS Directorate General	SHRI R. R. SINGH, SCIENTIST ‘E’/DIRECTOR AND HEAD (PRODUCTION AND GENERAL ENGINEERING DEPARTMENT) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI AJAY KUMAR
SCIENTIST ‘B’/ASSISTANT DIRECTOR
(PRODUCTION AND GENERAL ENGINEERING DEPARTMENT), BIS

This Page has been Intentionally left blank

This Page has been Intentionally left blank

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.

This Indian Standard has been developed from Doc No.: PGD 41 (18495).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 — 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 — 2367 0012, 2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 — 265 9930

Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 — 2254 1442, 2254 1216

Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093 — 2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi